STABILITY OF SEQUESTERED PHOSPHORUS IN STORMWATER TREATMENT AREAS: ROLE OF VEGETATION

April 22, 2015

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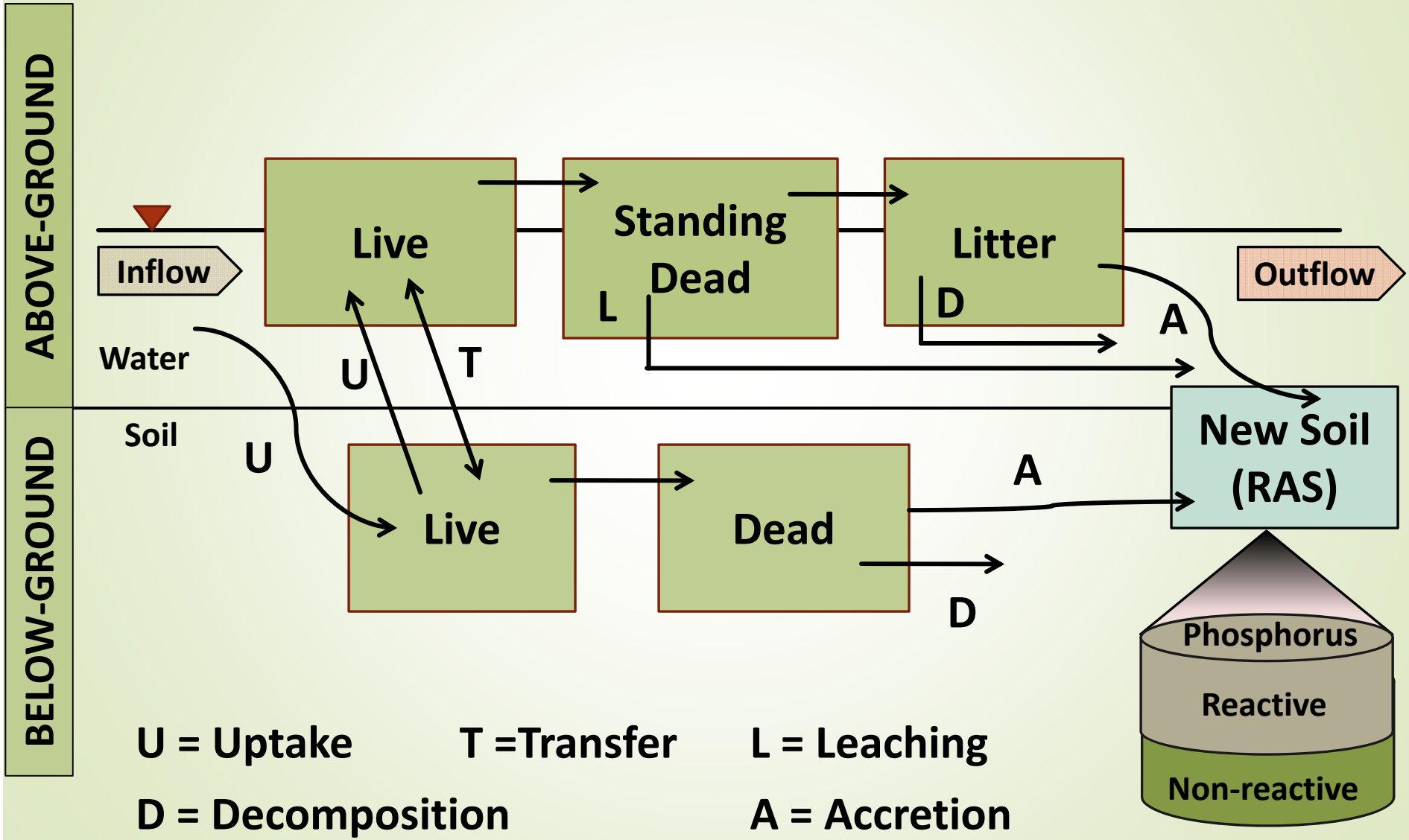
WETLAND PROCESSES



U = Uptake T =Transfer L = Leaching

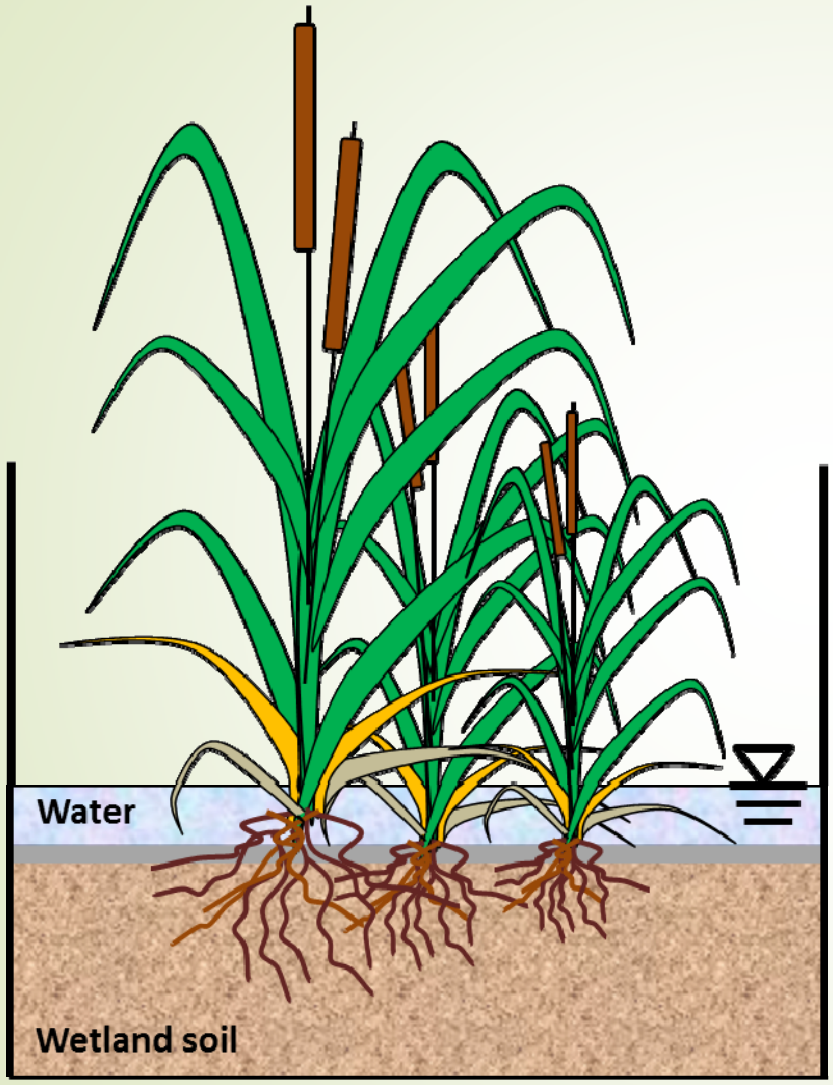
D = Decomposition A = Accretion

OBJECTIVE

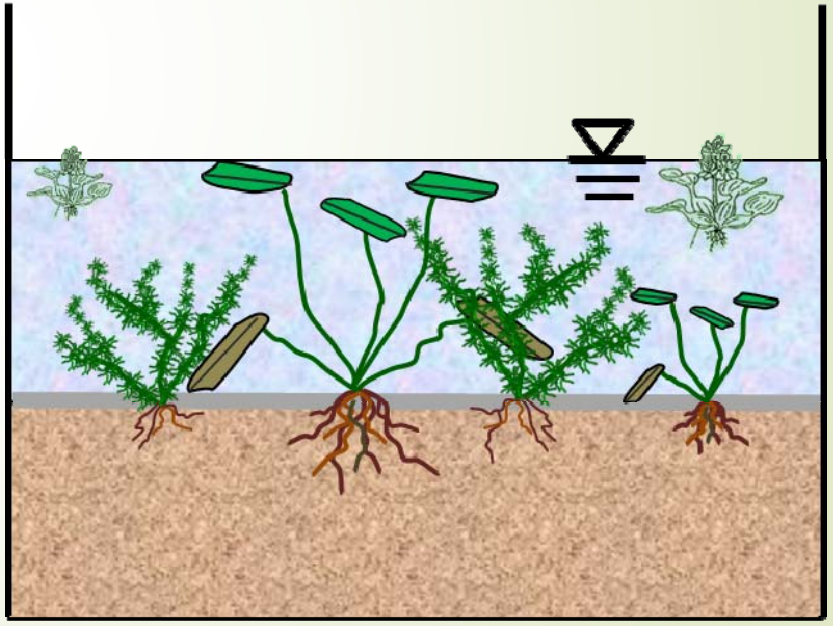
- Assess influence of wetland vegetation (EAV vs SAV) on stability of accreted P
  - Determine proportion of reactive and non-reactive P forms in STA soils
  - Examine the stability of accreted P in floc and Recently Accreted Soils (RAS)

  Hypothesis – Different vegetation types influence chemical stability of sequestered P in recently accreted soils of STAs

STA VEGETATION

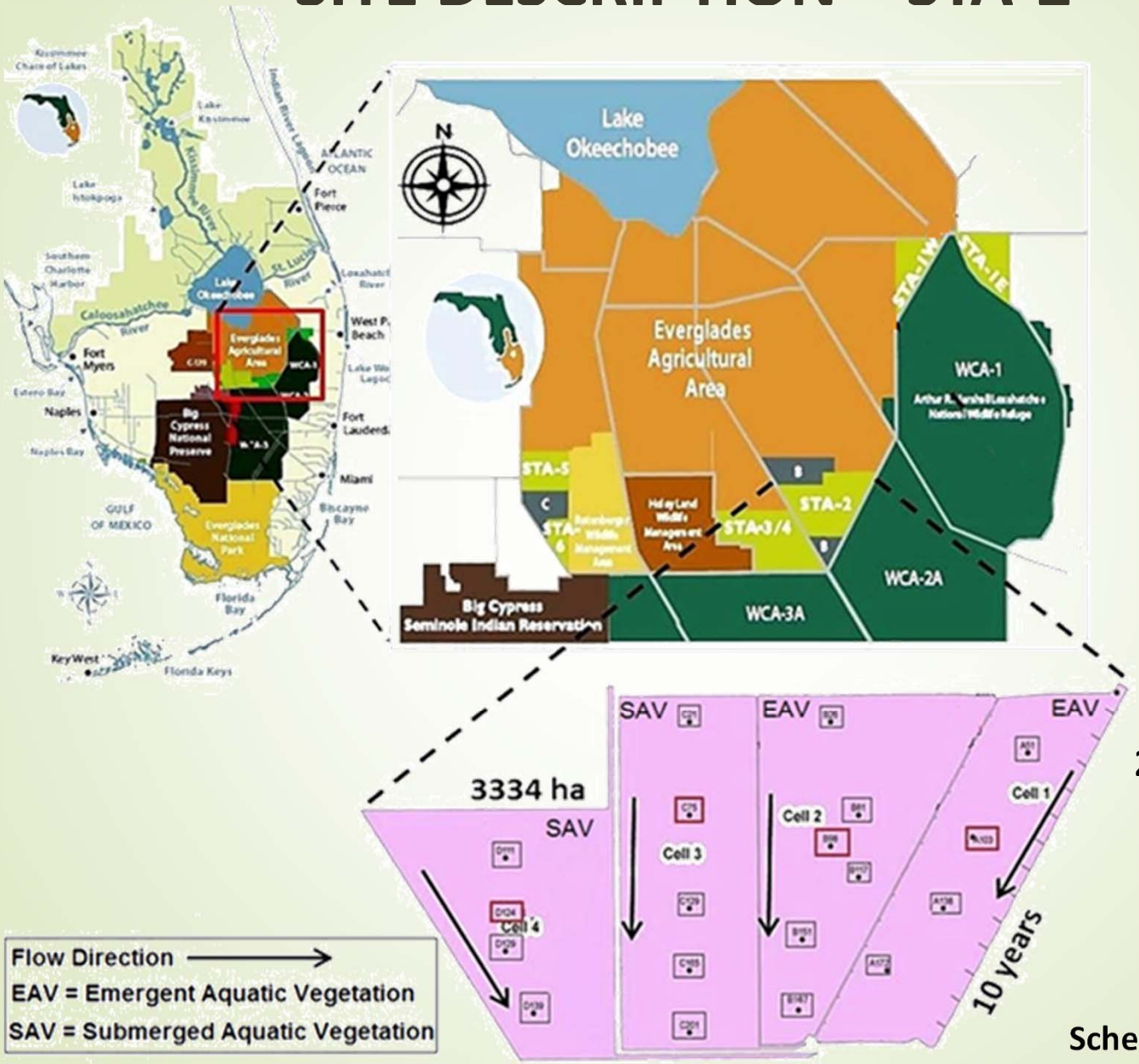


Emergent Aquatic Vegetation (EAV)



Submerged Aquatic Vegetation (SAV)

SITE DESCRIPTION – STA-2



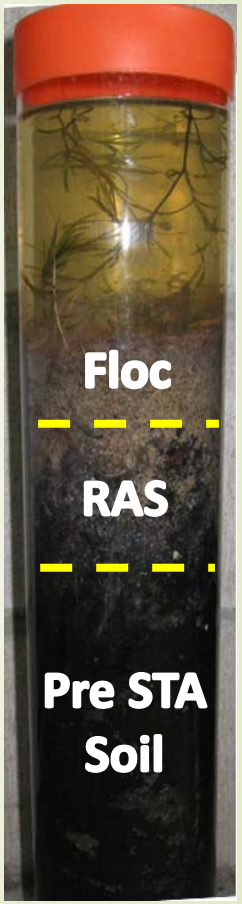
27 intact cores
Four cells

Schematics not to scale

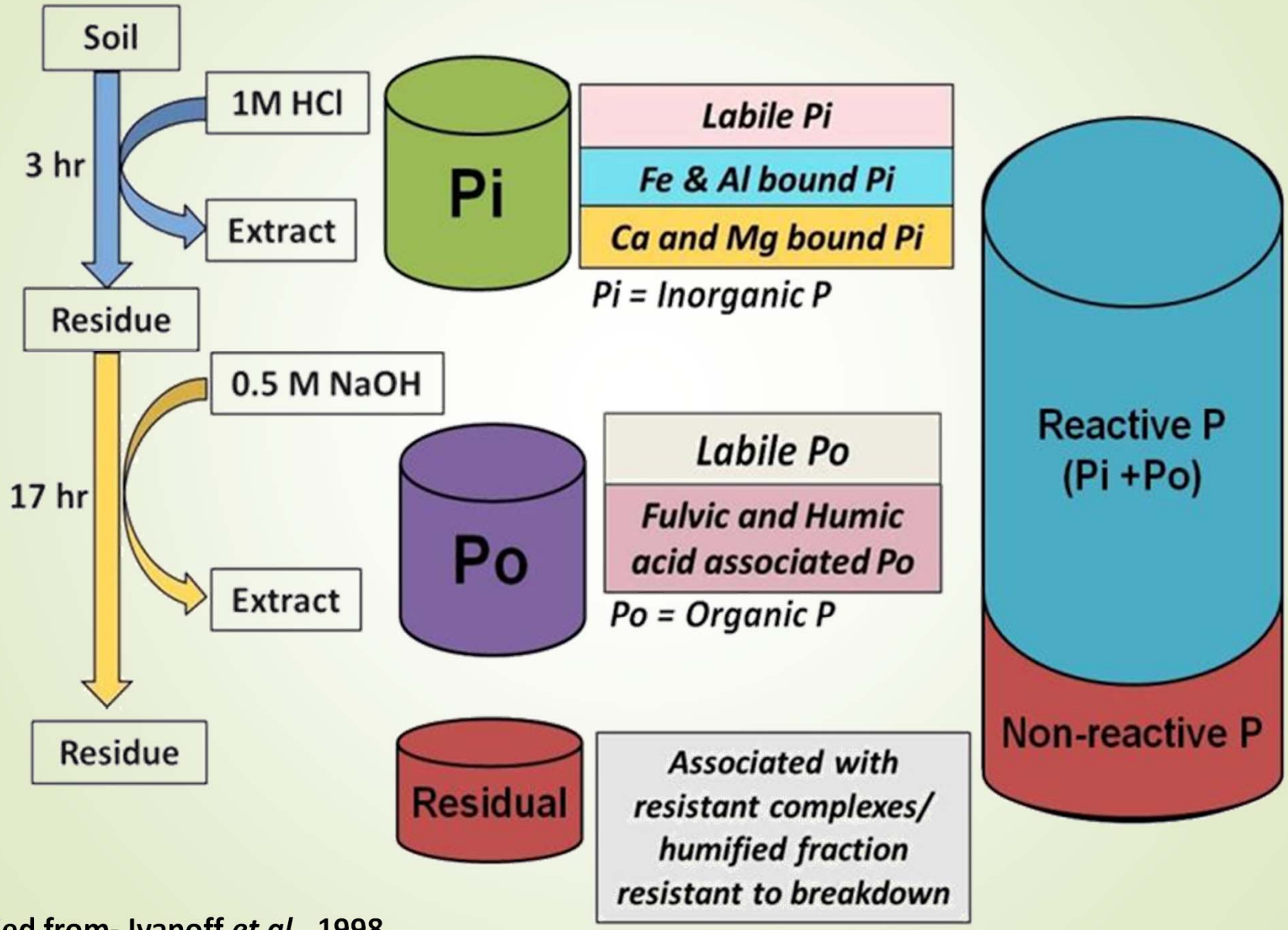
Base map source: South Florida Water Management District

METHODS

- Soil cores separated into floc, RAS and pre-STA soil
- Soil bulk density, total nutrients (P, C and N) were determined
- Reactive [Inorganic (Pi) & Organic (Po)] and non-reactive P pools were determined
- Phosphorus storages were characterized into reactive and non-reactive compartments for different aquatic vegetation



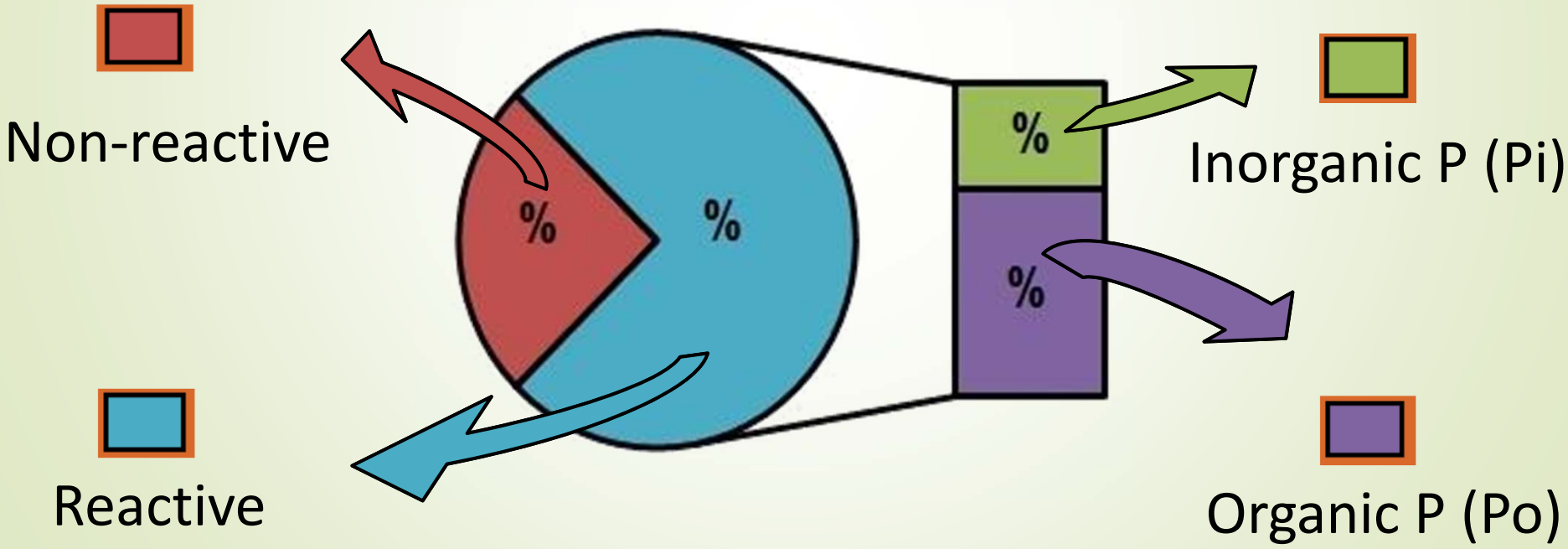
FRACTIONATION SCHEME



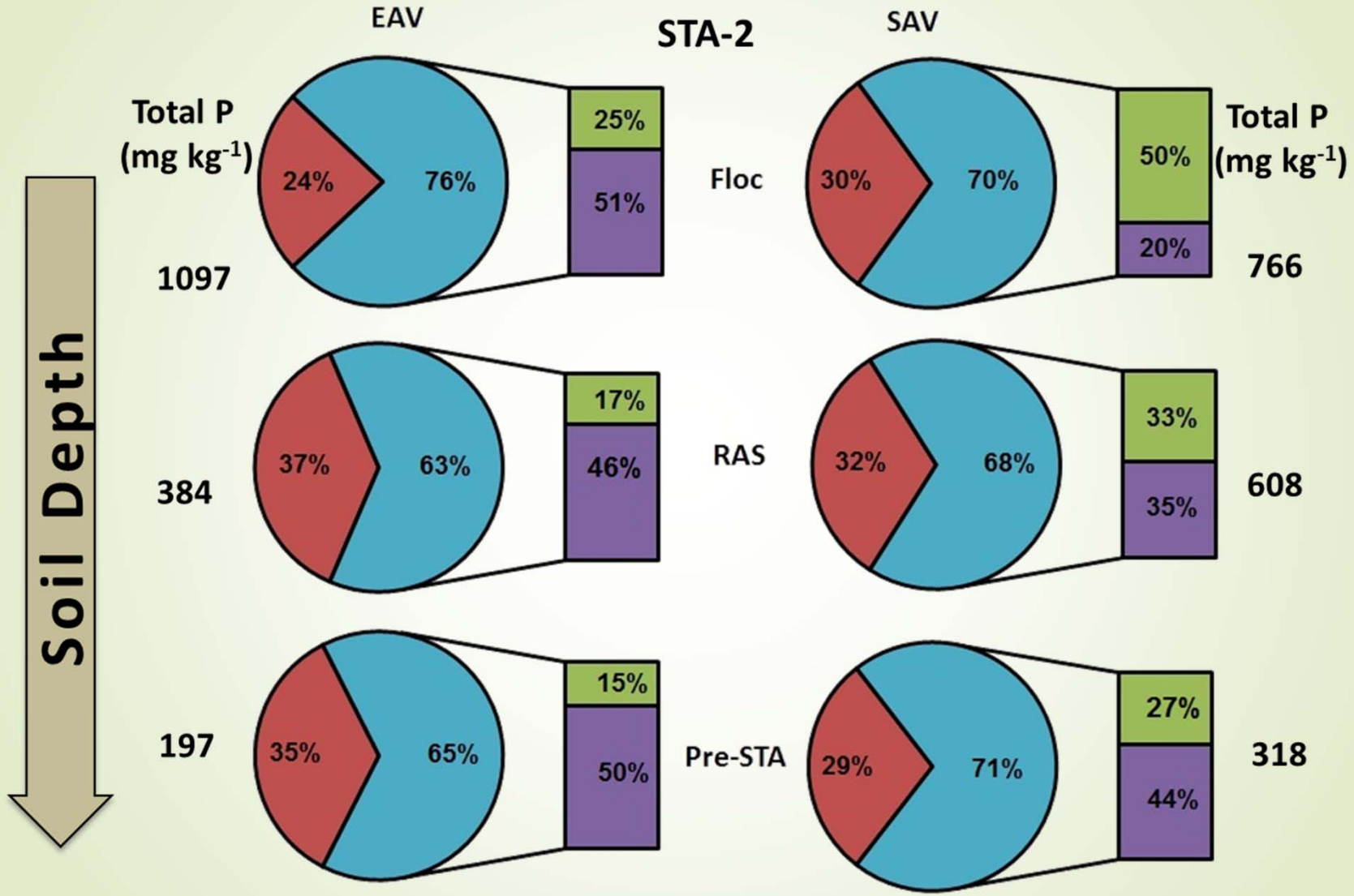
Modified from- Ivanoff *et al.*, 1998

FRACTIONATION RESULTS

- Fractions shown as percentage of total P
- Inorganic and organic phosphorus together makes reactive P pool

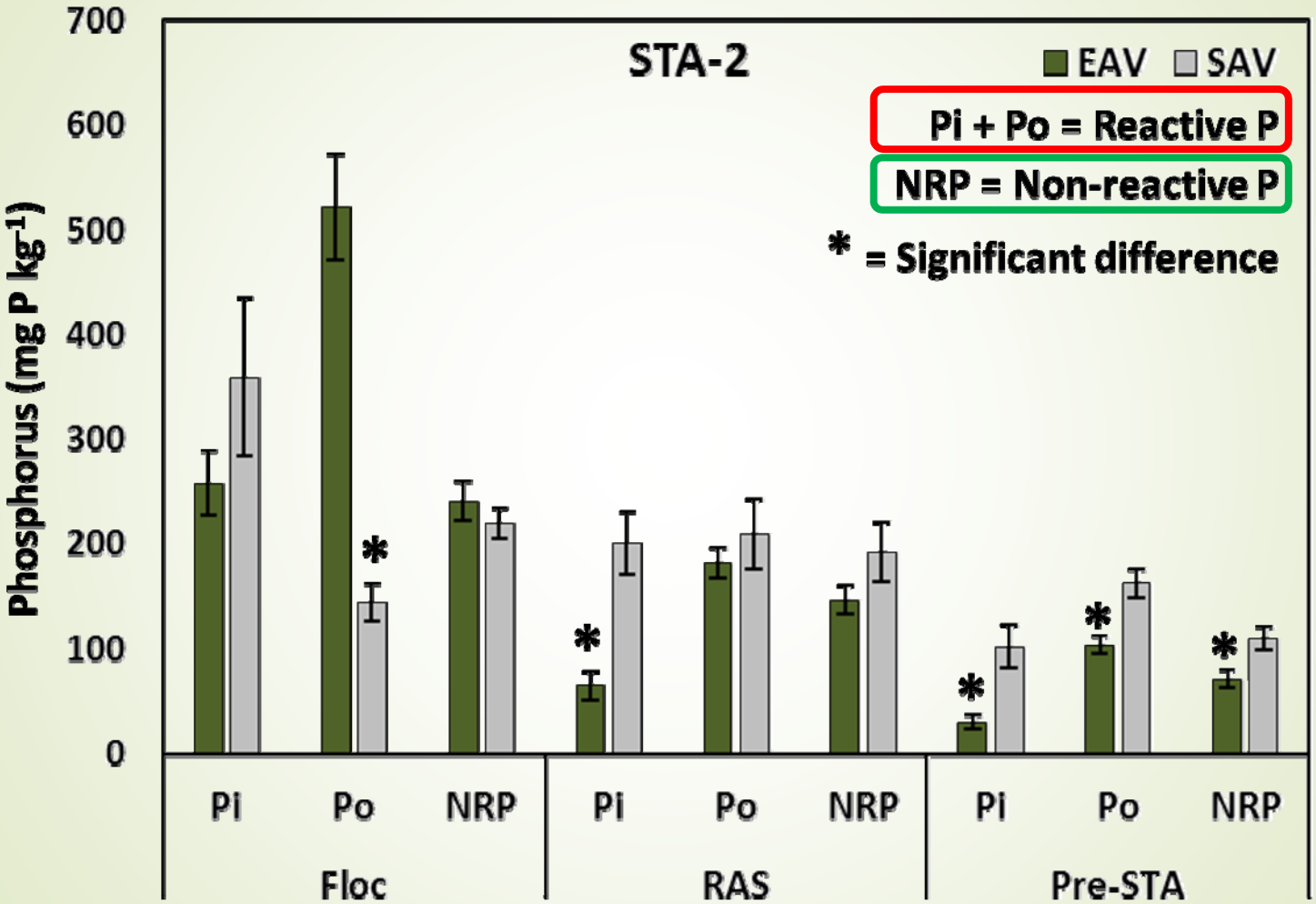


FRACTIONATION RESULTS



Non-reactive Reactive Inorganic P (Pi) Organic P (Po)

FRACTIONATION RESULTS



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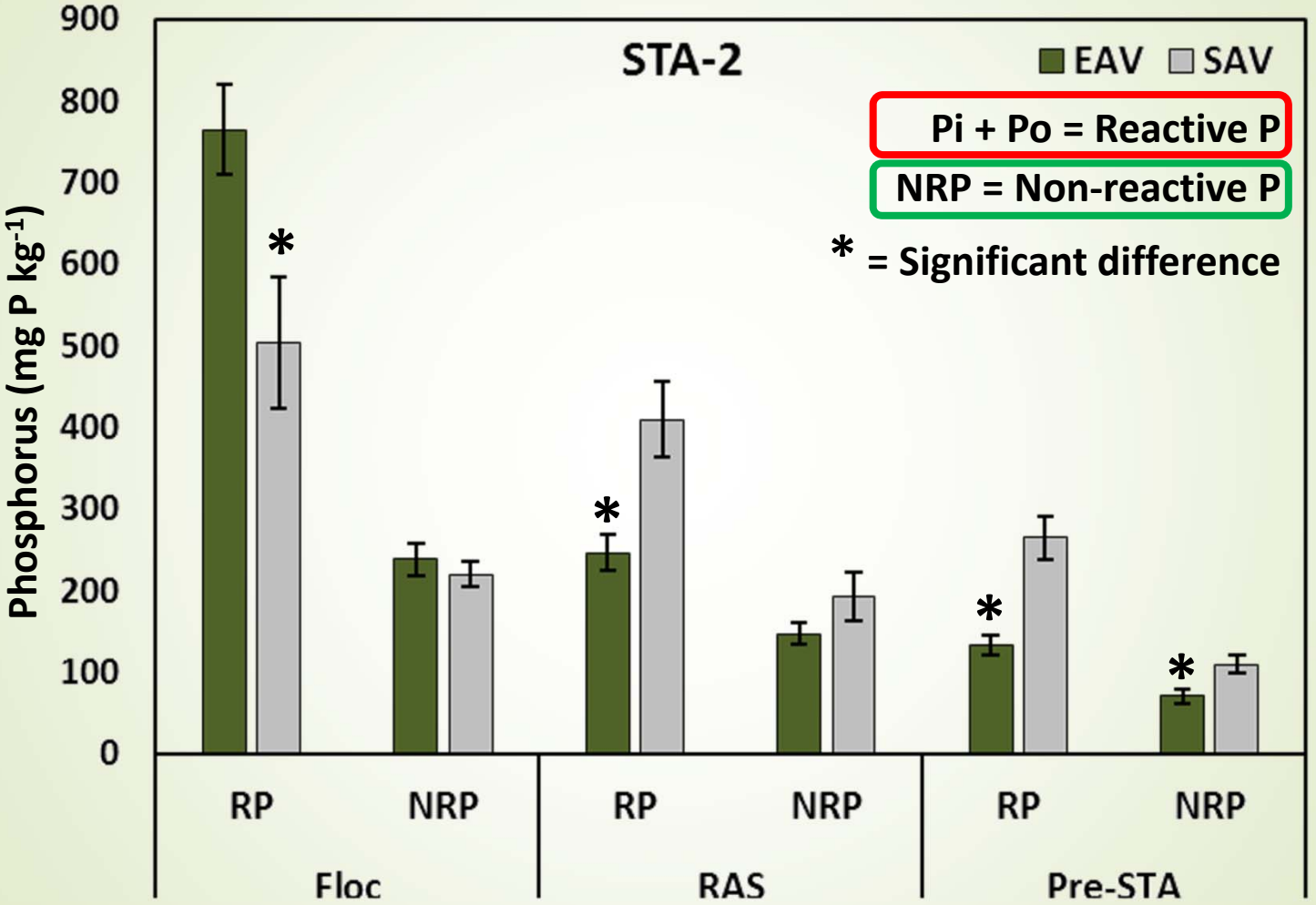
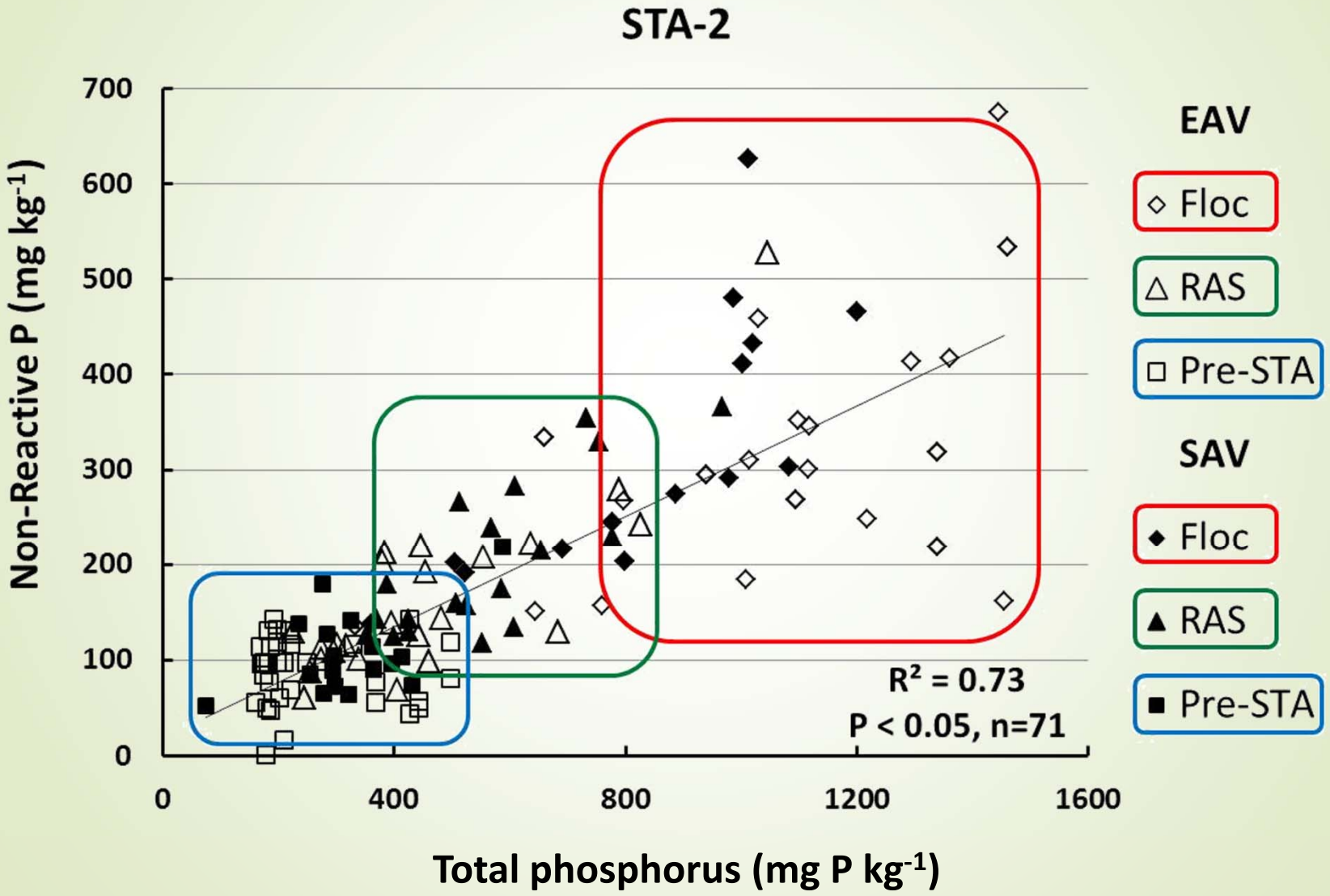
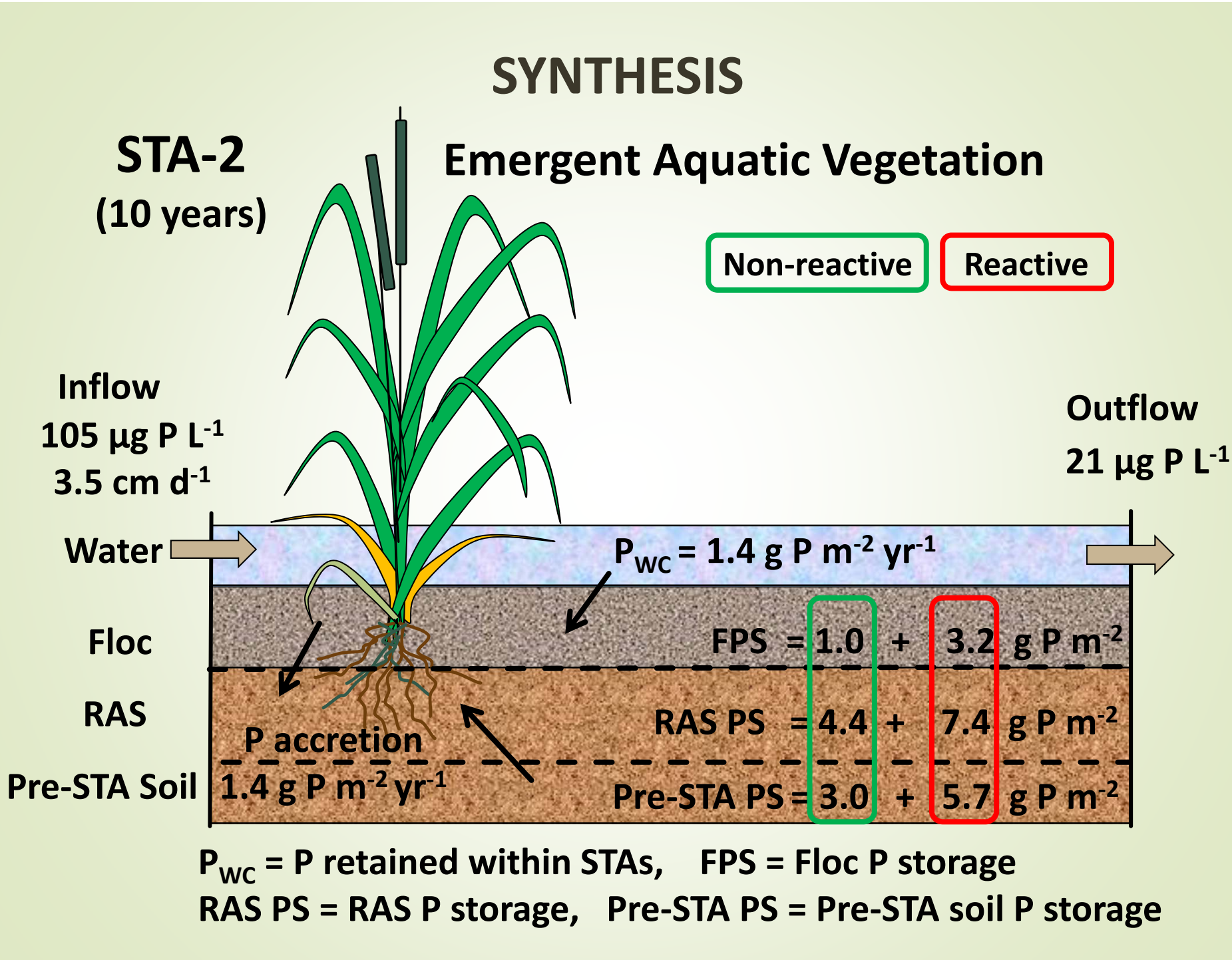


NON-REACTIVE PHOSPHORUS POOL



SYNTHESIS



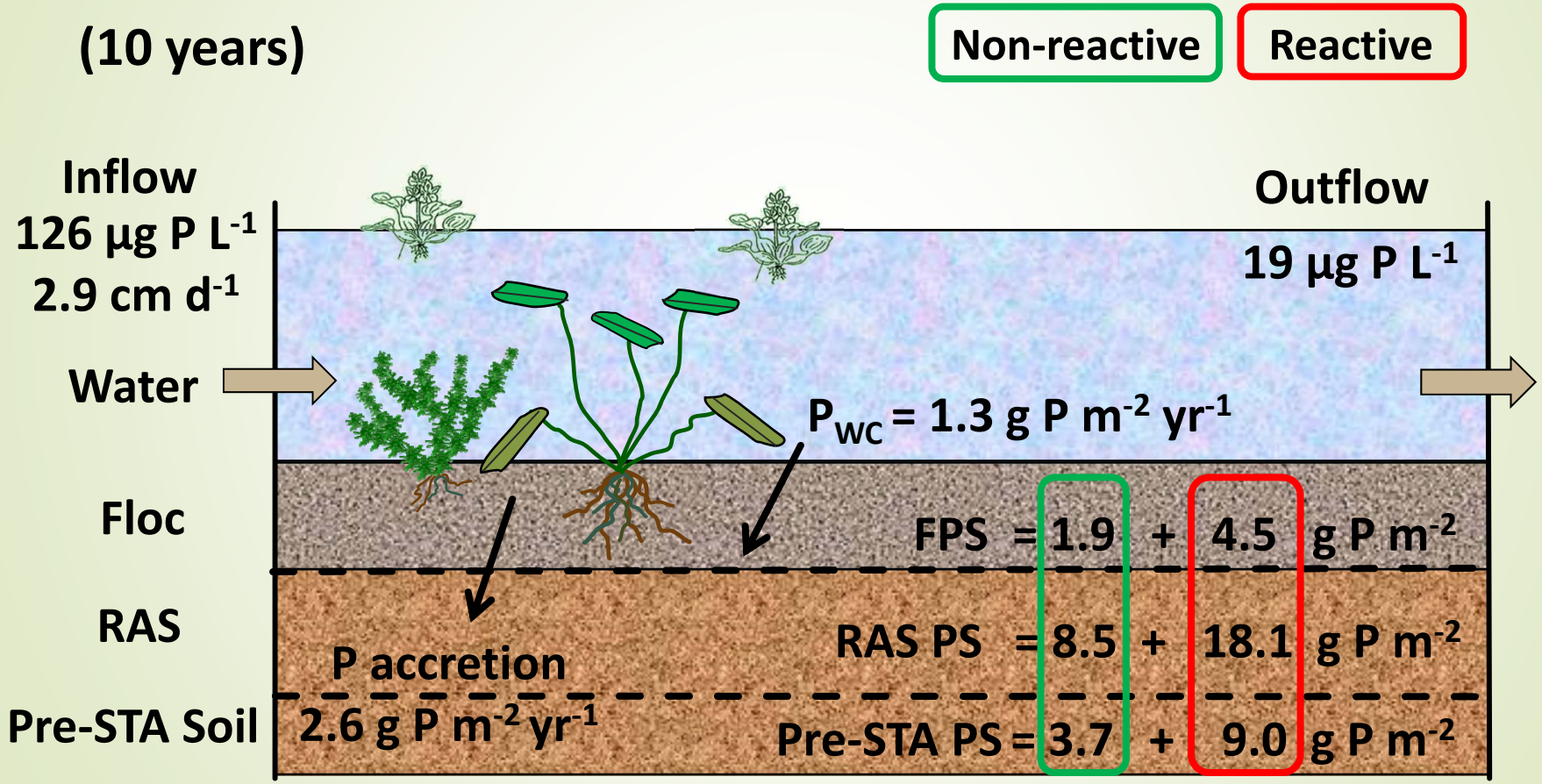
P_{WC} = P retained within STAs, FPS = Floc P storage

RAS PS = RAS P storage, Pre-STA PS = Pre-STA soil P storage

SYNTHESIS

Submerged Aquatic Vegetation

STA-2
(10 years)



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CONCLUSIONS AND IMPLICATIONS

- 20-30 % of P is present in non-reactive forms
- Reactive P pools in SAV floc significantly lower than EAV
- Reactive P pools in SAV RAS significantly higher than EAV
- For both EAV and SAV, non-reactive P storage was 2-3 times more than NRP
- In SAV, accretion rate and P storage is greater than EAV but high proportion of RP renders it susceptible for mobilization
- More research is needed to understand long-term stability of accreted P in STA soils

ACKNOWLEDGEMENTS

Financial support for this research

- SFWMD
- Everglades Foundation fellowship
- William K. Robertson scholarship
- Florida Stormwater Association scholarship
- Soil and Water Science Department

- Thanks to the SFWMD scientists – Ms. Delia Ivanoff, Dr. Mike Chimney, Dr. Hongjun Chen and Mr. Manuel Zamorano
- Wetland Biogeochemistry Lab – Ms. Yu Wang, Dr. Kathy Curtis and Mr. Gavin Wilson

THANK YOU!